

WHAT IS CLAIMED IS:

1. A videoendoscope comprising:

an inspection probe comprising an inspection tube having a distal endpiece housing an optoelectronic imaging device delivering an electrical signal;

a video processor for processing the electrical signal delivered by the imaging device in order to generate a video signal;

a control handle comprising a control unit secured to the proximal end of the inspection tube and provided with means for controlling and adjusting the video processor;

an umbilical connection cable having a distal end secured to the control unit for connecting the videoendoscope to a light source and to an electrical power supply;

a display unit including a video display screen connected to the video processor in order to display the video signal; and

a bundle of lighting fibers integrated without interruption in the umbilical cable, in the control handle, and then in the inspection tube, and having a distal end housed in the distal endpiece that serves to light a target observed by the probe when a proximal end of the umbilical cable is connected to a light generator; wherein the display unit is secured to a side face of the control unit, the control unit having a control panel on a top face and carrying control members comprising said means for controlling and adjusting the video processor, and being of elongate shape between its distal end and its proximal end so as to be suitable for being held in one hand while allowing the control members to be actuated by using the thumb of said hand.

2. A videoendoscope according to claim 1, wherein the umbilical cable is connected to the control unit via a side face thereof.

3. A videoendoscope according to claim 1, wherein the display unit is secured to the control unit via a hinge enabling the display screen to be tilted about an axis perpendicular to the side face of the control unit, the display unit being electrically coupled to the control unit by means of electrical conductors passing through the hinge.
4. A videoendoscope according to claim 3, wherein the hinge is constituted by a connector providing releasable mechanical and electrical connection between the display unit and the control unit.
5. A videoendoscope according to claim 1, wherein the proximal end of the umbilical cable is secured to a connection unit fitted with connection means for connection to the proximal end of the bundle of lighting fibers and to a light generator, and connection means for connecting the videoendoscope probe to an electrical power supply.
6. A videoendoscope according to claim 5, wherein the connection endpiece has fixing means for fixing a mechanical adapter to adapt the connection endpiece to the connection endpiece of any light generator, the control panel including a control member for controlling initialization of the video processor as a function of the color temperature of the lamp of the light generator.
7. A videoendoscope according to claim 1, wherein the video processor is included in the control unit.
8. A videoendoscope according to claim 7, wherein the control unit has mechanical and electrical coupling means on both side faces to enable the display unit to be fixed

and electrically connected to either side face of the control unit.

5 9. A videoendoscope according to claim 1, wherein the video processor is integrated in the display unit.

10 10. A videoendoscope according to claim 1, wherein the video processor is integrated in a connection unit for connecting the proximal end of the umbilical cable to an external unit.

15 11. A videoendoscope according to claim 5, wherein the connection unit further comprises connection means for connecting the probe to a system for processing and/or storing images, the videoendoscope probe further comprising switch means designed to deliver to the video screen either the video signal coming from the video processor or the video signal coming from the system for processing and/or storing images.

20 12. A videoendoscope according to claim 11, wherein the control unit has means for controlling a system for processing and/or storing images, which system is connected to the connection means of the connect unit, said connection means including a pin for transmitting the video signal generated by the video processor to a video input of the system for processing and/or storing images, a pin for transmitting to the switch means a video signal generated by the system for processing and/or storing images, and a pin for connecting the control means of the control unit to a control interface of the system for processing and/or storing images.

35 13. A videoendoscope according to claim 11, further comprising means for controlling the switch means to direct the video signal coming from the system for processing and/or storing images to the video screen

immediately said system is connected to the connection means.

5 14. A videoendoscope according to claim 11, wherein the switch means are integrated in the control unit.

15. A videoendoscope according to claim 11, wherein the switch means are integrated in the display unit.

10 16. A videoendoscope according to claim 11, wherein the switch means are integrated in the connection unit.

15 17. A videoendoscope according to claim 11, wherein the connection means for connecting the probe to a system for processing and/or storing images includes a connection pin enabling the videoendoscope to be powered from an electrical power supply associated with the system for processing and/or storing images.

20 18. A videoendoscope according to claim 11, wherein the connection unit includes means for connecting the videoendoscope probe to an auxiliary electrical power supply.

25 19. A videoendoscope according to claim 11, wherein the connection unit includes means for connecting the videoendoscope probe to an auxiliary video monitor, the switch means including means for sending the video signal applied to the input of the video screen towards the
30 connection means for connection to the auxiliary video monitor.

35 20. A videoendoscope according to claim 11, wherein the control handle has means for controlling the switch means.

21. A videoendoscope according to claim 1, wherein the control unit further comprises:

- an electromechanical device designed to deform a deformable distal bending section integrated in the distal end of the inspection tube in order to steer the observation window of the probe, the electromechanical device comprising two motors actuating the distal bending section via two respective pairs of cables for steering the distal end of the inspection tube in two respective planes;
- a processor delivering two control signals that are applied respectively to the two motors; and
- command input means comprising two command input members connected to the processor to input commands intended for the two motors respectively, each of the two command members having a first state in which the processor controls the corresponding motor to keep the orientation of the distal end of the inspection tube fixed, and second and third states in which the processor controls the respective motor to cause the distal end of the inspection tube to vary its orientation respectively in one direction and in the opposite direction.

22. A videoendoscope according to claim 21, wherein each of the motors is of the servo-motor type actuating a pulley coupled to a respective cable pair and of angular position that can be controlled by the respective control signal generated by the processor and applied to the motor, each control signal being in the form of a pulse train, with the width of the pulses corresponding to a determined angular position of the pulley, the processor comprising means for keeping the width of the pulses in each control signal constant so long as the respective control member is in its first state, and for increasing and decreasing the width of the pulses at a predefined

speed whenever the corresponding control member is respectively in its second or third state.

23. A videoendoscope according to claim 21, including an
5 additional control member integrated in the control panel
and connected to the processor to cause the width of the
pulses in the control signals applied to the motors to be
controlled in such a manner as to be equal to a middle
value corresponding to zero deformation of the distal
10 bending section.

24. A videoendoscope according to claim 23, wherein the
additional control member is integrated in the control
input means for controlling the distal bending section.
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25. A videoendoscope according to claim 21, wherein each
of the two control members comprises a pair of contacts
which are both open in the first state, with one or other
of the contacts being closed in the second and third
20 states.

26. A videoendoscope according to claim 25, wherein each
of the control members comprises two pushbuttons
integrated in the control panel to actuate two respective
25 contacts which are in the open state when at rest, and
which pass to the closed state when the corresponding
pushbutton is held pressed down.

27. A videoendoscope according to claim 21, wherein the
30 means for inputting commands for the bending section
comprise a joystick suitable for actuating both command
input members simultaneously.

28. A videoendoscope according to claim 21, including an
35 additional control member integrated in the control panel
to modify the speed at which the distal end of the

inspection tube is steered by selecting a slow speed or a fast speed.

5 29. A videoendoscope according to claim 21, wherein the processor is programmed to select a fast speed of variation for steering the distal end the inspection tube if at least one of the two control members is maintained in the second or third state for a duration longer than a predefined threshold, and to select a slow speed for
10 varying the steering of the distal end of the inspection tube if both control members are in the first state.

15 30. A videoendoscope according to claim 21, wherein the processor is programmed to determine the orientation of the distal end of the inspection tube as a function of the form of the control signals applied respectively to two motors, and to display on the display screen symbols representing the determined orientation.

20 31. A videoendoscope according to claim 1, including a storage and transport case containing an electrical power supply and a lighting generator, the storage case containing a drum around which the probe can be wound, the drum being mounted in such a manner as to be capable
25 of turning freely about its axis and having a tubular cavity for receiving the distal end of the probe, and opening out tangentially to the cylindrical surface of the drum.

30 32. A videoendoscope according to claim 31, wherein the drum comprises a central hub held between two side plates on the same axis, the cavity being made from one of the side faces of the hub and being closed latterly by one of the two side plates.

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33. A videoendoscope according to claim 31, wherein the central hub is made of a material presenting a high coefficient of friction.

5 34. A videoendoscope according to claim 32, wherein the central hub is made of a hard cellular foam.

35. A videoendoscope according to claim 31, wherein the storage case has a housing in which the drum is secured,
10 the housing possessing an opening giving access to a portion of the cylindrical surface of the drum.

36. A videoendoscope according to claim 31, wherein the case has a lid whose inside face is covered in foam, the
15 drum being mounted in the case in such a manner as to be prevented from rotating by the foam in the lid when the lid is closed on the case.

37. A videoendoscope according to claim 31, wherein the
20 inside diameter of the cylindrical cavity is slightly greater than the greatest diameter of the distal end of the probe that is to be wound about the drum.